Regional Information Report No. 1J08-05

A Program for Improving Management and Research of Fisheries in the Southeast Region—Shellfish Fisheries

by

Kyle Hebert

February 2008

Alaska Department of Fish and Game **Division of Commercial Fisheries**

Symbols and Abbreviations

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Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity (negative log of)	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat. or long.
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Measures (fisheries)

fork length	FL
mideye-to-fork	MEF
mideye-to-tail-fork	METF
standard length	SL
total length	TL

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	*e*
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	*E*
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

REGIONAL INFORMANTION REPORT NO. 1J08-05

A PROGRAM FOR IMPROVING MANAGEMENT AND RESEARCH OF FISHERIES IN THE SOUTHEAST REGION—SHELLFISH FISHERIES

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February 2008

The Regional Information Report Series was established in 1987 and was redefined in 2007 to meet the Division of Commercial Fisheries regional need for publishing and archiving information such as project operational plans, area management plans, budgetary information, staff comments and opinions to Board of Fisheries proposals, interim or preliminary data and grant agency reports, special meeting or minor workshop results and other regional information not generally reported elsewhere. Reports in this series may contain raw data and preliminary results. Reports in this series receive varying degrees of regional, biometric and editorial review; information in this series may be subsequently finalized and published in a different department reporting series or in the formal literature. Please contact the author or the Division of Commercial Fisheries if in doubt of the level of review or preliminary nature of the data reported. Regional Information Reports are available through the Alaska State Library and on the Internet at: http://www.sf.adfg.ak.us/statewide/divreprots/htlm/intersearch.cfm.

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This document should be cited as:
Hebert, Kyle. 2008. A Program For Improving Management And Research Of Fisheries In The Southeast Region—Shellfish Fisheries. Alaska Department of Fish and Game, Regional Report Series No. 1J08-05 Douglas, Alaska.

TABLE OF CONTENTS

Page

LIST OF TABLES ii

ABSTRACT 1

INTRODUCTION 1

Overview of Southeast Region Shellfish Fisheries 1
Stock Assessment for Southeast Regional Shellfish Fisheries 1
Management of Southeast Regional Shellfish Fisheries 2

PROPOSED PROJECTS 5

A. Southeast Alaska Shellfish Project Staff 6

Project A.1. Southeast Alaska Shellfish Biometrician I 6
Project A.2. Southeast Alaska Shellfish Research Project Fishery Biologist II 7
Project A.3. Southeast Alaska Shellfish Management Project Fishery Biologist II 7
B. Stock Assessment Projects 8

Project B.1. Southeast Alaska Tanner Crab Stock Assessment 8
Project B.2. Southeast Alaska Pot Shrimp Stock Assessment 8
Project B.3. Southeast Alaska Crab Habitat Mapping 9
Project B.4 Tanner Crab Population Independent Verification 10
Project B.4. Red King Crab Population Independent Verification 10
Project B.5. Southeast Area Dungeness Crab Stock Assessment and Soft Shell Monitoring 11
Project B.6. Yakutat Area Dungeness Crab Stock Status Update 12
Project B.7. Yakutat Area Tanner Crab Stock Status Update 12
C. Personal Use Harvest Documentation 13

Project C.1. Southeast Region Shellfish Personal Use Harvest Documentation 13

LIST OF TABLES

Table **Page**

Table 1.–Summary of proposed shellfish fishery projects and estimated costs (thousands of dollars). 3

ABSTRACT

This report summarizes research and management information gaps and projects to address those gaps for shellfish fisheries in Southeast Alaska. Projects identified in this document are currently unfunded or under funded. If fully funded these projects would contribute to the knowledge base for the species associated with each project and in many cases facilitate abundance-based management of fisheries that exploit those stocks

Key words: Shellfish, funding, king crab, Tanner crab, Dungeness crab, pot shrimp, assessment

INTRODUCTION

OVERVIEW OF SOUTHEAST REGION SHELLFISH FISHERIES

Shellfish fisheries in the Southeast Region target a diversity of species across all management areas from Ketchikan to Yakutat. The major shellfish fisheries occur in Area A, from Dixon Entrance to Cape Fairweather, and these include pot fisheries for spot and coonstripe shrimp, Tanner crab, red king crab, golden king crab, and Dungeness crab, as well as a long-standing beam trawl fishery for pink shrimp. Yakutat area fisheries, from Cape Fairweather to Cape Suckling, include pot fisheries for Tanner crab, Dungeness crab, and shrimp, as well as a trawl fishery for shrimp and a dredge fishery for scallops. Regionally, all of these fisheries are important economically, grossing over $14 million annually in landed value in recent years. From a statewide perspective, the shrimp fisheries are the last significant fisheries of their kind, and the Dungeness crab fishery is the largest in the state.

The major issues facing the region's shellfish fisheries are fleet intensification, local depletion, and the resulting needs for better stock assessment information and for more and active management. Traditionally, the shellfish fisheries were managed with regional guideline harvest levels based on historical catch records. Those methods are largely inadequate now that our fleets have become larger and more efficient. As a consequence, the shellfish stocks have been fished hard, in some cases for decades. As fishing pressure has grown, the region's shellfish stocks have seen depletion of local populations. This occurred in the past decade in the Yakutat area for both Dungeness and Tanner crabs, and those fisheries are closed to allow rebuilding to occur. Similar large scale closures of shellfish fisheries in Southeast Alaska are not anticipated; however, local harvest and effort trends indicate our shellfish stocks require increasingly fine-scaled assessment and management to avoid depletions of local populations that can accumulate to force regional stock closures.

Another major issue, particularly for king crab and Tanner crab fisheries, is the industry's chronic lack of confidence in the department's survey and stock assessment program. This has been a serious challenge for the region's shellfish staff to overcome and it has been a roadblock to effective dialogue with participants in these fisheries. Management of these fisheries may be improved by finding ways to help the industry understand the value that the department places on fishery-independent survey programs and a movement toward abundance-based management.

STOCK ASSESSMENT FOR SOUTHEAST REGIONAL SHELLFISH FISHERIES

The information available to manage regional shellfish fisheries lags far behind the information that is needed. Shellfish abundance is difficult to estimate. They do not swim home to natal streams where they can be counted, as salmon do, and they have a diversity of complex life histories that makes stock assessment challenging. However, shellfish are not impossible to count, and in fact, our department has pioneered the use of various stock assessment tools to

estimate crab populations, as for example, has been done with several important stocks in the Bering Sea. The value in doing so is to be able to set harvest levels based on abundance, which is the hallmark of successful fisheries management, including our state's salmon management program. To this end, we have adopted the catch-survey analysis used for several Bering Sea crab stocks to estimate the abundance of red king crab in Southeast Alaska. This information has been used successfully for nearly a decade to set conservative harvest levels based on abundance. For the past two years, the same model has been used to estimate the abundance of Tanner crab in Southeast Alaska. This year, the resultant guideline harvest levels were implemented for the 2008 commercial Tanner crab fishery.

The shellfish program in the Southeast Region has made substantial progress towards developing improved stock assessment for species other than red king and Tanner crab; however, much of what has been done to date in improving stock assessment has been on a trial or pilot study basis. There are significant shortfalls in funding to fully evaluate the risk and sustainability of current harvest levels for the region's shellfish fisheries. The stock assessment projects described here are designed as a concerted move towards abundance-based management similar to the regional programs for red king and Tanner crab.

MANAGEMENT OF SOUTHEAST REGIONAL SHELLFISH FISHERIES

Management of the shellfish fisheries in the Southeast Region is in transition. Historically, harvest guidelines were set for each region (Southeast and Yakutat) as a whole without regard to fishing patterns and local stock concentrations. For this reason, management has been the responsibility of the regional shellfish management biologist and there has been a reluctance to move towards more localized management without sufficient staffing, operational funds, or appropriate management controls. Intensification of regional shellfish fisheries has generally led away from single guideline harvest levels for the region as a whole. However, ideas of the best management approach (regional versus smaller scale) for shellfish fisheries in Southeast Alaska have fluctuated as additional data, information and experience is gained from these fisheries.

Increasing effort in the Southeast Alaska pot shrimp fishery in the mid-1990s led the department to establish district level guideline harvest levels and to transfer management authority to individual area offices, principally Ketchikan, Petersburg, Sitka, Juneau and Haines. Staff in those offices can more fully focus on tracking local catches to stay within the guidelines, and they are also more attuned to local area concerns, such as localized depletion and missing year classes. Transferring management authority to area offices is not the solution for all shellfish fisheries; indeed, the area office staffs would have to be enlarged significantly for that to be possible. Instead, gradual changes are being put into place to accomplish localized management where feasible.

The red king crab fishery has a mixture of local and regional management. The guideline harvest level is set for the region, but the survey-based stock assessment program allows the department to identify local areas, usually bays, having low abundance or weak stock segments. As needed, these areas may be closed for one or more seasons, or they may be opened for a shorter period than the region as a whole to allow local populations to rebuild. Similar harvest controls are possible on a district level basis using stock abundance estimates from the assessment surveys, and these may be used in the future depending on the availability of staff resources to achieve more finely scaled management. Also, to meet commercial fishery allocation guidelines set by the Board of Fisheries, the department sets maximum harvest levels in Section 11-A near Juneau.

The golden king crab fishery currently has seven management areas in regulation. This is two more than in prior years as a result of Board of Fisheries action, which divided two of the five traditional areas. This was done to allow harvests to more accurately reflect varying stock status among areas. The drawback of more finely dividing the management activity has been an increasing burden to track local catches by department staff. Despite this burden, the department recognizes that more localized management in may help ensure long-term sustained yield. This is an important economic as well as biological goal, given that the golden king crab fishery has exceeded the harvests of the red king crab fishery by a factor of two in recent years.

The Southeast Tanner crab and Dungeness crab fisheries are two of the most valuable regional shellfish fisheries. They are both managed on a regional basis. Of these two species, there is a stock assessment survey in place only for Tanner crab. As this stock assessment program matures, there may be increased options to manage Tanner crab on a regional scale or smaller scale to minimize the risk of local depletions threat to long-term sustained yield. Although there have been limited stock assessment efforts for Dungeness crab, there remains a need, especially in light of the Yakutat Dungeness crab population collapse. It will be important for these fisheries to have adequate staffing in the regional and area offices to meet the increasing needs and opportunities for localized management.

Table 1.–Summary of proposed shellfish fishery projects and estimated costs (thousands of dollars).

Project	Estimated First-Year Cost	Estimated Annual Continuing Cost	Duration
A. Shellfish Project Staff			
A.1. Southeast Alaska Shellfish Biometrics	$85.0	$85.0	Long Term
A.2. Southeast Alaska Shellfish Research Fishery Biologist II	$78.0	$78.0	Long Term
A.3. Southeast Alaska Shellfish Management Biologist II	$78.0	$78.0	Long Term
B. Shellfish Stock Assessment			
B.1. Southeast Alaska Tanner Crab Stock Assessment	$175.0	$175.0	Long Term
B.2. Southeast Alaska Pot Shrimp Stock Assessment	$40.0	$40.0	Long Term
B.3. Crab Habitat Mapping	$50.0	$50.0	Three Years
B.4. Tanner Crab Population Independent Verification	$70.0	--	One Year
B.5. Red King Crab Population Independent Verification	$70.0	--	One Year
B.6. Southeast Area Dungeness Crab Stock Assessment and Soft Shell Monitoring	$150.0	$144.0	Long Term

-Continued-

Table 1.–continued (page 2 of 2)

Project	Estimated First-Year Cost	Estimated Annual Continuing Cost	Duration
B.7. Yakutat Area Dungeness Crab Stock Status Update	$30.0	$30.0	One Year
B.8. Yakutat Area Tanner Crab Stock Status Update	$30.0	$30.0	One Year
C. Personal Use Harvest Documentation			
C.1. Southeast Region Shellfish Personal Use Harvest Documentation	$33.0	$33.0	Long Term
Total	$889.0	$743.0	

PROPOSED PROJECTS

This document contains a list of projects proposed for increased funding. The projects described are either not conducted due to a lack of funding or are currently operated at levels insufficient to meet increasing management needs. Projects are grouped into four categories (A–D) and are listed in Table 1. The categories are not prioritized, but the projects within each category are listed in order of priority.

The first category (A) includes a list of additional staff needed to maintain operating the Shellfish Project at the current level of activity. Additional staffing is the greatest need of the Shellfish Project. In 2006 the region implemented a major split within the Shellfish Project that resulted in separate Research and Management sections. This was done in response to a need for more focused attention on crab management issues and stock assessment development and reporting. There exist a minimal number of positions to effectively maintain this split and additional staff will allow much smoother and independent operation of these two units. Due to reductions in funding in FY04, the Shellfish Project was reduced by two positions, a Fishery Biologist II and a Fish and Wildlife Technician III. Functions of both positions have been distributed among other Shellfish Project staff, however this has increased already heavy workloads and has lessened the ability to adequately meet the needs of other shellfish projects. The Shellfish Project has taken on some major surveys over the past several years, with only a modest increase in staffing. Newly implemented projects include a Tanner crab stock assessment survey and a pot shrimp stock assessment survey. Pot survey work was also done for Dungeness crab in 2000-2004 but that project has been suspended. Although vital information on stock status is being collected, through stock assessment surveys, their development has reduced the time available for staff to regularly communicate with commercial fleets, creating a growing gap of understanding between fishers and the department. Furthermore, the insufficient staffing levels are preventing full and timely incorporation of this information into management and dissemination to the public.

The second category (B) covers eight stock assessment projects. Projects in this category were ranked according to the most pressing needs to evaluate success in achieving sustainable harvests. The first project is for long-term support for a region wide Tanner crab survey. The department conducts a Tanner crab survey that provides relative abundance information, but the funding for this project is not considered a stable source for long-term projects. The recent five-year average ex-vessel value of the Tanner crab fishery has been approximately $1.8 million. The second priority project is stock assessment for the pot shrimp fishery. This is probably the single most fragile shellfish fishery in the region in terms of the potential for serial stock depletion, and also one of the most challenging to assess. In addition, the commercial pot shrimp fishery is quite valuable with an average ex-vessel value in recent years of approximately $2.5 million. Although the department received a $25.0k increment of CFEC funds in FY07, this was a partial amount to that which was requested and the balance is requested for FY08. A benthic habitat mapping project is ranked third. This is intended to help delineate habitat for use in restratification of the department's Tanner crab, red king crab, or shrimp stock assessment surveys. Previous results from restratification have shown that survey effort becomes more proportional to variability in catch rates and ultimately produces more precise estimates of abundance.

The fourth and fifth priorities are to develop and implement independent verification of the department's abundance estimates for Tanner and red king crab, respectively. The department conducts similar stock assessments for these species. Although the methods used are considered scientifically sound, industry representatives have difficulty believing the results are accurate. An independent method may be developed ground truth estimates derived from the catch-survey model. Development of a stock assessment and soft shell monitoring program for Southeast Alaska Dungeness crab stocks is ranked sixth. The Southeast Dungeness crab fishery is very intense in nature and there is a high degree of uncertainty regarding stock status and the viability of the relatively passive management system that has been used historically. Harvests in this fishery have been relatively stable at approximately 4.4 million pounds per year with a record harvest of 7.3 million pounds in 2002. In recent years, the average exvessel value of the Southeast Alaska Dungeness crab fishery has been approximately $6.4 million. The seventh and eighth ranked projects are for reconnaissance surveys of Yakutat area Dungeness and Tanner crab, respectively. Both fisheries are closed and are to remain closed until better stock status information is obtained. These projects would be limited in nature and would be fielded on a biannual basis to determine if stock recovery has taken place. If indications of stock recovery are documented with small-scale surveys, then more detailed stock assessment monitoring projects would be developed.

The remaining category (C) has only one project. Personal use harvest documentation is important for estimating total fishing mortality as personal use harvests increase in significance relative to commercial harvests. Obtaining estimates of personal use red king crab harvest was a high priority recommendation from an independent review panel convened in 2005.

A. Southeast Alaska Shellfish Project Staff

Project A.1. Southeast Alaska Shellfish Biometrician I

Location: Region wide.

Primary Objective: To fully develop the stock assessment methods and to provide ongoing biometric support for the region's shellfish research projects.

Description: Currently, just one position is funded to provide biometric support for all shellfish and dive fisheries in the Southeast and Yakutat areas. A backlog of stock assessment modeling, analyses, and reporting is accumulating. A major stock assessment project for pot shrimp is now in the phase of project development and requires a significant amount of population modeling and harvest strategy determination. Other existing, new projects requiring biometric support are the onboard fishery sampling programs for golden king crab, Tanner crab and beam trawl shrimp. Additional biometric support for future, high priority studies include development and analysis of a habitat-based restratification program for Tanner crab and shellfish, stock assessment programs for Southeast Alaska golden king crab fisheries and Yakutat area Dungeness and Tanner crabs. Funding for this position was included in the division's new fish and game license fees budget effective FY02, and CFEC funds in FY07, however, in each case this position was cut following a shift or absence of funding.

Duration: This project requires stable long-term funding because it is the salary support for a professional biometrician.

Estimated Annual Costs: $85.0.

Project A.2. Southeast Alaska Shellfish Research Project Fishery Biologist II

Location: Region wide.

Primary Objective: To assist with stock assessment for the region's shellfish stocks and assist with other shellfish research needs.

Description: Currently, the Shellfish Research section consists of one Fishery Biologist III (project leader), one Fishery Biologist II and one Fishery Biologist I. All shellfish research responsibilities are expected to be met by this staff. This includes stock assessment surveys for red king crab, Tanner crab, and spot/coonstripe shrimp, along with a golden king crab observer program. Each of these stock assessment programs would benefit by having dedicated personnel. The current staffing level of the Shellfish Research section is inadequate to maintain these stock assessment programs and fulfill other obligations, such as producing timely reports on the results of those surveys. The addition of a second Fishery Biologist II would help ensure a more complete and sound research program.

Duration: This project requires stable long-term funding because it is the salary support for a professional biologist.

Estimated Annual Costs: $78.0

Project A.3. Southeast Alaska Shellfish Management Project Fishery Biologist II

Location: Region wide.

Primary Objective: To manage or assist with management of the region's shellfish stocks and assist with other shellfish research needs.

Description: Currently, the Shellfish Management section consists of one Fishery Biologist III (project leader), one Fishery Biologist II and one Fish and Wildlife Technician IV. All shellfish management responsibilities must be met by this staff. This includes fisheries for red king crab, golden king crab, Tanner crab, Dungeness crab, beamtrawl shrimp, and Yakutat scallops. Each of these fisheries requires monitoring fisheries, tracking and storing catch data, working with stakeholders on management, developing management plans, and answering questions from the public. The new eLandings program is expected to streamline the fish ticket submission process, but will require additional long-term attention from department management staff. Additionally, the region's shellfish management staff has recently taken on more responsibility for management of the Yakutat scallop fishery, and even more may be expected with the recent re-organization of the Kodiak-based, statewide scallop observer and biometrics program. The current staffing level of the Shellfish Management section is inadequate to maintain the current management programs and fulfill other obligations, such as producing timely Annual Management Reports for all shellfish fisheries. The addition of a second Fishery Biologist II would help disperse duties so each staff member can concentrate on fewer fisheries and provide more focus to a set of fisheries that are known for their controversial issues and need of attention.

Duration: This project requires stable long-term funding because it is the salary support for a professional biologist.

Estimated Annual Costs: $78.0

B. Stock Assessment Projects

Stock abundance information that is collected independently of commercial harvest data is critically important for assessing the status of shellfish populations. The reason for this is that commercial shellfish fisheries target the largest individuals in the stock; however, the abundance of smaller individuals, as well as the abundance and reproductive condition of females, is also important information needed for decisions on allowable harvests. Hence, surveys are designed to assess these non-target as well as the marketable individuals of a fished species. This approach has proven successful in the region's red king crab assessment program, and the intent of the projects in this section is to bring the other major shellfish fisheries in the region to the same level of survey information.

The addition of large-scale or long-term projects requires additional staff. There is little or no time for additional projects that require current research and management staff. If funding is allocated for projects without additional staff, then proposed projects will likely not be feasible.

Project B.1. Southeast Alaska Tanner Crab Stock Assessment

Location: Northern Southeast Alaska.

Primary Objective: To produce a Tanner crab index of abundance

Description: The department conducts a Tanner crab stock assessment survey program in northern Southeast Alaska. Currently the survey's funding source is through revenue of fines and forfeitures generated through illegal harvest ("Fish and Game Fund"). As this funding source fluctuates annually, a stable long-term funding source is needed.

The Tanner crab pre-season survey is conducted annually to provide fishery-independent data with which to assess relative stock abundance and condition. The survey is typically about 20 days in duration and is conducted in October. Funds from this increment would pay for vessel time (fuel and stores), seaduty pay, field travel for staff to conduct the survey, and other miscellaneous supplies (e.g. scientific equipment).

Duration: A long-term stable funding source is desired.

Estimated Annual Costs Beginning FY09: $175.0.

Project B.2. Southeast Alaska Pot Shrimp Stock Assessment

Location: Southern and Central Southeast Alaska.

Primary Objective: Expand the pilot stock assessment surveys to more fully cover the major pot shrimp fishing grounds.

Description: The Commercial Fisheries Division has conducted surveys in four areas of Southeast Alaska. Those areas include Section 3-A, District 7, Section 13-C, and Tenakee Inlet. The initial surveys done in Districts 3 and 7 were funded through a Federal Nearshore Fisheries

Grant, however that grant expired and there is currently no federal funding for shrimp surveys in SEAK. The surveys in Hoonah Sound and Tenakee have been conducted using an industry contractor in all years except one (when there was no interest from the public in bidding the contract). In that year the department conducted the survey in Hoonah Sound using the State vessel Kittiwake. The region received an increment of $25.0k (CFEC funds) in FY07 in response to a request for $60.0k. This funding allowed surveys to continue in Districts 3 and 7 during the 2006 survey season. At the time of publishing this document, impending budget cuts for FY09 threatened this funding source and it was possible shrimp surveys would be eliminated if this funding were removed. The current increment request would provide additional State funding support for the Southeast Alaska commercial shrimp pot survey program. Funds would shift the existing program from soft funding, and allow an expansion of shrimp pot surveys into two other major harvest areas, such as Districts 1 and 10, where no stock assessment surveys are conducted. Management decisions for these areas, and all other non-surveyed areas, depend solely on information collected during commercial fisheries. Pre-season surveys would provide a fishery-independent source of information to augment current data sources. Additional funding may also pay for vessel charter costs if necessary. Other costs that would be covered by this increment include seaduty pay, vessel fuel and stores, travel costs for staff and miscellaneous costs associated with the surveys (bait, miscellaneous supplies, etc).

The department also conducts inseason on the grounds surveys in several areas of the region. These areas include Districts 3, 6, 7, 8, 10, 12, and 13 (Hoonah Sound). The purpose of these surveys is to collect unsorted biological sample data directly from commercial pots, determine catch rates to determine season length, and to provide direct interaction between industry and the fleet on the grounds. The costs of these inseason commercial surveys have never had specific directed funding from any source. This increment would be used to cover some of these costs (State vessels costs, sea duty costs, fuel, etc) if the funds are not spent to cover pre- and/or post-season surveys.

Duration: A long-term stable funding source is desired.

Estimated Annual Costs: $65.0.

Project B.3. Southeast Alaska Crab Habitat Mapping

Location: Northern Southeast Alaska.

Primary Objective: Initiate benthic habitat mapping survey to improve shellfish stock assessment surveys in Southeast Alaska.

Project Description: This project would begin collecting benthic habitat information to be used to improve stock assessment of shellfish populations in Southeast Alaska, particularly for red king crab, Tanner crab and spot shrimp. The use of side scan sonar and multibeam sonar has been proven to be highly useful for delineating habitat for habitat-selective species, such as rockfish. By incorporating more precise knowledge of shellfish habitat, surveys may better target populations, resulting in more precise estimates of population size.

Funding would pay for vessel fuel and stores, seaduty pay, field travel for staff, scientific equipment, and computer software. The department purchased a sidescan sonar system in FY06 and has conducted training exercises to calibrate the equipment and determine the usefulness of this approach for delineating benthic habitat. Early indications are that this tool will allow a

better understanding of the extent and distribution of habitat and enable a spatial relationship to be developed between habitat characteristics and shellfish population distribution.

Duration: Three years.

Estimated Annual Costs Beginning FY09: $50.0.

Project B.4 Tanner Crab Population Independent Verification

Location: Northern Southeast Alaska

Primary Objective: To estimate Southeast Alaska Tanner crab population size independently of current survey and modeling methods to evaluate accuracy of current methods.

Description: The department conducts an annual stock assessment survey to help evaluate overall level and condition of the Tanner stock in Southeast Alaska. However, the crab industry in Southeast Alaska has repeatedly criticized the department's survey methods, claiming that the results indicate a population size that is much lower than what is observed by the fleet. There may be several alternative methods that could produce population estimates that are independent of the department's annual stock assessment survey and subsequent catch-survey analysis (CSA). One way to verify the accuracy of current estimates is to conduct a mark-recapture experiment. This would could produce an estimate of population size or an estimate of exploitation rate, by examining the proportion of marked crab that are caught in the commercial fishery relative to the number that are released during a marking event just prior to the fishery. Another method is use of an remotely operated vehicle (ROV) to directly observe crab in situ, produce estimates of density, and provide an area-swept population estimate. Another alternative is to conduct surveys prior to and just after a commercial fishery to obtain data on the change in ratio of legal or mature crab, which can be modeled to estimate population size. Finally, current survey methods and use of CSA could be maintained, but with a much higher sampling rate. Although the last alternative would not be independent of current methods, it could produce results based on more thorough coverage of the sampling area, which may directly address the specific industry complaint that segments of the crab population are missed during the regular survey. At this time, it is clear there is a need to initiate a project to verify current methods in order to gain the industry's confidence in the department's survey. It is not yet clear which method would be best to achieve the objective. Costs of one of the alternatives are expected to include vessel time, tags or ROV, travel, premium pay, and rewards for tag returns. The number of areas for which the project would be conducted tailored to fit the budget.

Duration: Two years

Estimated Costs Beginning FY09: $70.0

Project B.4. Red King Crab Population Independent Verification

Primary Objective: To estimate Southeast Alaska red king crab population size independently of current survey and modeling methods to evaluate accuracy of current methods.

Description: The department conducts an annual stock assessment survey to help evaluate overall level and condition of the red king stock in Southeast Alaska. However, the crab industry in Southeast Alaska has repeatedly criticized the department's survey methods, claiming that the

results indicate a population size that is much lower than what is observed by the fleet. The department's survey methods for red king crab and Tanner crab are very similar, but conducted at different times of the year and in different areas (although two areas overlap). As for Tanner crab, there may be several alternative methods that could produce red king crab population estimates that are independent of the department's annual stock assessment survey and subsequent catch-survey analysis (CSA). One way to verify the accuracy of current estimates is to conduct a mark-recapture experiment. This would could produce an estimate of population size or an estimate of exploitation rate, by examining the proportion of marked crab that are caught in the commercial fishery relative to the number that are released during a marking event just prior to the fishery. Another method is use of an remotely operated vehicle (ROV) to directly observe crab in situ, produce estimates of density, and provide an area-swept population estimate. Another alternative is to conduct surveys prior to and just after a commercial fishery to obtain data on the change in ratio of legal or mature crab, which can be modeled to estimate population size. Finally, current survey methods and use of CSA could be maintained, but with a much higher sampling rate. Although the last alternative would not be independent of current methods, it could produce results based on more thorough coverage of the sampling area, which may directly address the specific industry complaint that segments of the crab population are missed during the regular survey. At this time, it is clear there is a need to initiate a project to verify current methods in order to gain the industry's confidence in the department's survey. It is not yet clear which method would be best to achieve the objective. Costs of one of the alternatives are expected to include vessel time, tags or ROV, travel, premium pay, and rewards for tag returns. The number of areas for which the project would be conducted tailored to fit the budget.

Duration: Two years

Estimated Costs Beginning FY09: $70.0

Project B.5. Southeast Area Dungeness Crab Stock Assessment and Soft Shell Monitoring

Location: Southeast Alaska.

Primary Objective: Reinitiate the Southeast Alaska Dungeness crab survey program that was cancelled in 2005 to enhance the department's survey data time series and life history research in support of management.

Description: The Dungeness crab fishery in Southeast Alaska continues to intensify, and the department has in the past worked with an industry task force and the Alaska Board of Fisheries to develop fishing strategies to minimize risks of overexploitation and stock depletions. The department initiated a pilot program in FY01 to estimate abundance and exploitation rates of Dungeness crab in two major fishing areas of Southeast, near Petersburg and Wrangell. In FY02, the preseason stock assessment survey was expanded to additional fishing grounds in northern Southeast, and added post-season surveys in both southern and northern Southeast. Post-season surveys were eliminated due to budget shortfalls in FY04 and the entire program was cancelled in FY05 (2005 field season) due to budget shortfalls.

In conjunction with the survey efforts, the department had initiated basic life history research to estimate growth rates, molting increments, and molt timing and natural mortality rates. A tagging study was implemented to determine molt increment and molting probability in Dungeness crab.

In addition, pot soak time and mesh selectivity studies are needed. These data are critical for interpreting survey results.

A study to monitor soft shell and handling mortality could be useful to the Board of Fisheries for making decisions about allowing commercial fisheries during sensitive times of year. At the 2006 BOF meeting a proposal was submitted to open Districts 1 and 2 during summer month, rather than fall and winter. It was rejected partially due to a concern about higher levels of softshell than in northern areas of Southeast Alaska, however a more thorough investigation of incidence of sofshell among areas, months and years is necessary to be conclusive.

Such a project could not be initiated without additional staff, sea duty pay, vessel charter, and operational funds.

Duration: A long-term stable funding source is desired.

Estimated Cost: $150.0.

Project B.6. Yakutat Area Dungeness Crab Stock Status Update

Location: Yakutat.

Primary Objective: Implement a small-scale reconnaissance stock assessment survey for Dungeness crab in the Yakutat area.

Description: The Yakutat area Dungeness crab stocks are presently in a collapsed state. The commercial fishery was closed effective for the summer and fall portions of the 2000/2001 fishing season. No stock improvement is evident with existing information. The fishery will remain closed until stock recovery can be demonstrated and an adequate research and management program has been developed for this fishery. The costs for initiating a small scale reconnaissance stock assessment survey for Yakutat Dungeness crabs include funds for commercial vessel charter costs, sea duty pay, and operational funds. The department conducted a limited Dungeness crab test fishery in the Yakutat area in 2004. Results from that project indicate that Dungeness crab stocks in the Yakutat area continued to be very depressed.

Duration: Biannually until some level of stock recovery is identified.

Estimated Annual Costs Beginning FY07: $30.0.

Project B.7. Yakutat Area Tanner Crab Stock Status Update

Location: Yakutat.

Primary Objective: Implement a small-scale reconnaissance stock assessment survey for Tanner crab in the Yakutat area.

Project Description: The Yakutat area Tanner crab stocks are presently in a collapsed state. The commercial fishery was closed effective with the 2000/2001 fishing season. No stock improvement is evident with existing information. The fishery will remain closed until stock recovery can be demonstrated and an adequate research and management program has been developed for this fishery. This project would work with industry to identify sampling locations and to conduct biannual sampling to assess the status of the stock. The costs for initiating a

small-scale reconnaissance stock assessment survey for Yakutat Tanner crab include funds for commercial vessel charter costs, sea duty pay, and operational funds.

Duration: Biannually until some level of stock recovery is identified.

Estimated Annual Costs Beginning FY07: $30.0.

C. Personal Use Harvest Documentation

Accurate harvest records are vitally important in fisheries management and the Commercial Fisheries Division goes to great lengths to obtain all catch information for commercial shellfish fisheries. Presently, there is a very limited program for documenting personal use catches. Several personal use fisheries have grown in recent years, and total mortality from those fisheries has become significant relative to total commercial harvests.

Project C.1. Southeast Region Shellfish Personal Use Harvest Documentation

Location: Southeast Alaska and Yakutat.

Primary Objective: To collect personal use shellfish harvest information from all major harvest areas/communities in the region.

Description: Presently, our knowledge of harvest by personal use and subsistence fishers of commercially important species of shellfish in the Southeast Alaska and Yakutat Areas are extremely limited. Our data is limited to a red king crab permit requirement in the Juneau area, and creel census data and mail-out survey data obtained by the Sport Fish Division from major communities in Southeast. The creel census primarily occurs during the salmon season, so harvesters are typically not interviewed during the late fall–spring season. A key component of population modeling requires knowledge of harvest by all user groups (known mortality). This was made clear by a scientific panel that was charged with reviewing the region's red king crab stock assessment program. Among the panel's recommendations was that a comprehensive data collection system be initiated for personal use crab harvest in Southeast Alaska. This project would fund a comprehensive, region-wide shellfish harvest survey to increase the department's understanding of the magnitude of personal use shellfish harvest and the impact of that harvest on the region's shellfish stocks.

Duration: A long-term stable funding source is desired.

Estimated Annual Costs: $33.0.